

**Please amend the claims as follows:**

1. (currently amended) A database management system having the improvement comprising:

bitmap values, a bitmap value having a representation of a bitstring wherein set bits

5 specify a set of objects whose definitions are built into the database management system, and

bitmap operations provided by the database system, a bitmap operation having user-  
specified operands which are bitmap values and/or sets of objects~~which permit users of the~~  
~~database system to directly specify operations on the bitmap values.~~

1 2. (currently amended) The database management system set forth in claim 1 wherein the  
2 ~~user-accessible~~bitmap operations comprise at least:

3 a set-to-bitmap operation wherein a bitmap value is derived from a ~~given~~ set of the  
4 objects specified in an operand.

1 3. (currently amended) The database management system set forth in claim 2 wherein:

2 the derived bitmap value is a new bitmap value that specifies the objects in the ~~given~~  
3 specified set.

1 4. (currently amended) The database management system set forth in claim 2 wherein:

2 the derived bitmap value is a preexisting bitmap value which now further specifies the  
3 objects in the ~~given~~specified set.

1 5. (currently amended) The database management system set forth in claim 2 wherein:

2 the derived bitmap value is a preexisting bitmap value which now no longer  
3 specifies any objects in the ~~given~~specified set.

1 6. (currently amended) The database management system set forth in claim 1 wherein the  
2 ~~bitmap user-accessible~~ operations comprise at least:

3 a bitmap-to-set operation wherein the set of ~~the~~ objects specified in a ~~given~~ bitmap  
4 value specified in an operand is derived from the ~~given~~specified bitmap value.

1 7. (currently amended) The database management system set forth in claim 1 wherein the  
2 ~~user-accessible~~bitmap operations comprise at least:

3 a bitmap-to-count operation wherein the number of the objects in the set specified in a  
4 ~~given~~bitmap value specified in an operand is derived from the ~~given~~specified bitmap value.

1 8. (currently amended) The database management system set forth in claim 1 wherein the  
2 ~~user-accessible~~bitmap operations comprise at least:

3 an existence operation wherein a value representing the logical value TRUE is returned  
4 when an ~~given~~object specified in an operand belongs to the set of the objects represented by a  
5 ~~given~~bitmap value specified in another operand.

1 9. (currently amended) The database management system set forth in claim 1 wherein the  
2 ~~user-accessible~~bitmap operations comprise at least:

3 a logical operation on a first bitstring ~~represented by~~from a first bitmap value  
4 specified in an operand and a second bitstring ~~represented by~~from a second bitmap value  
5 specified in another operand.

1 10. (currently amended) The database management system set forth in claim 1 wherein the  
2 ~~user-accessible~~bitmap operations comprise at least:

3 a comparison operation on a first bitmap value specified in an operand and a second  
4 bitmap value specified in another operand wherein a value representing the logical value  
5 TRUE is returned when the first bitmap value and the second bitmap value specify the same set  
6 of ~~the~~ objects.

1 11. (currently amended) The database management system set forth in claim 1 wherein:

2 the bitmap values ~~include~~include settable bitmap values; and

3 the ~~user-accessible~~bitmap operations comprise at least an assignment operation which  
4 sets a target settable bitmap value specified in an operand from a source bitmap value specified  
5 in another operand.

1 12. (original) The database management system set forth in claim 1 wherein:

2 the bitmap values include bitmap values that are persistent in the database management  
3 system.

- 1   **13.** (currently amended) The database management system set forth in claim 12 wherein:  
2       the persistent bitmap values include bitmap values in user-specified fields of tables of  
3   the database management system.
- 1   **14.** (currently amended) The database management system set forth in claim 1 wherein:  
2       the ~~bitstring~~bitstring in the bitmap value is compressed.
- 1   **15.** (original) The database management system set forth in claim 1 wherein:  
2       the objects are identifiers for other objects that exist in the database management  
3   system.
- 1   **16.** (original) The database management system set forth in claim 15 wherein:  
2       the identifiers for the other objects are row identifiers of rows in the database  
3   management system.
- 1   **17.** (original) The database management system set forth in claim 16 wherein:  
2       the row identifiers are row identifiers returned by a user-defined query executed in the  
3   database management system.
- 1   **18.** (original) The database management system set forth in claim 17 wherein:  
2       the query returns a row identifier when a field in the row has an attribute specified in  
3   the query,  
4   whereby the bitmap value represents the set of fields having the specified attribute.
- 1   **19.** (original) The database management system set forth in claim 1 wherein:  
2       the objects are identifiers for other objects that exist outside the database management  
3   system.
- 1   **20.** (original) The database management system set forth in claim 19 wherein:  
2       the identifiers for objects that exist outside the database management system are  
3   electronic product codes for product items.

1 **21.** (original) A data storage device, the data storage device being characterized in that:  
2 the data storage device contains code which, when executed in a computer system,  
3 implements the database management system set forth in claim 1.

1 **22.** (currently amended) A bitmap value employed in a database management system, the  
2 bitmap value representing a first subset of a second subset of objects that are defined in the  
3 database management system, set of first objects, the first objects being external to the  
4 database management system and members of the first set being mapped onto a members of a  
5 second set of second objects that is defined in the database management system, and  
6 the bitmap value comprising:

7 a mapping specifier that maps a string of bits to ~~a subset of the second set~~the second  
8 subset; and

9 a representation of the string of bits wherein a bit is set in the represented string of bits  
10 when the member of the second ~~set~~subset that is mapped to the bit belongs to the first subset  
11 and the database management system providing at least a first operation which permits users of  
12 the database system to specify the mapping of the string of bits to the second subset and a  
13 second operation which permits users to directly specify setting bits of the string of bits that  
14 correspond to the first subset~~has a member of the first set mapped thereto.~~

1 **23.** (original) The bitmap value set forth in claim 22 wherein:  
2 the second objects are ordered.

1 **24.** (currently amended) The bitmap value set forth in claim 23 wherein:

2 the order of the ~~members of the second ordered set~~objects corresponds to values of the  
3 ~~members thereof~~objects;

4 the mapping specifier specifies the mapping by specifying one or more ranges of the  
5 values of the ~~members of the second ordered set~~objects to which the string of bits is mapped;  
6 and

7 the representation of the string of bits represents strings of bits corresponding to the  
8 ranges.

1 **25.** (original) The bitmap value set forth in claim 24 wherein:

2           the mapping specifier specifies the range of the values by specifying a start value and  
3   an end value.

1   **26.** (original) The bitmap value set forth in claim 24 wherein:

2           the values include a prefix which determines a range of the values; and

3           the mapping specifier specifies the range of the values by specifying the prefix for the  
4   range.

1   **27.** (original) The bitmap value set forth in claim 26 wherein:

2           the mapping specifier further specifies the range of the values by using a start value and  
3   an end value to specify one or more subranges of the range specified by the prefix.

1   **28.** (canceled)

1   **29.** (currently amended) The bitmap value set forth in claim 22 wherein:

2           ~~the identifiers for objects in the first set~~ are electronic product codes ~~for the objects~~.

1   **30.** (original) The bitmap value set forth in claim 22 wherein:

2           there is a plurality of the bitmap values in the database management system; and  
3   certain of the bitmap values are persistent in the database management system.

1   **31.** (currently amended) The bitmap values set forth in claim 30 wherein:

2           the persistent bitmap values include bitmap values in user-specified fields of tables of  
3   the database management system.

1   **32.** (original) The bitmap value set forth in claim 22 wherein:

2           the representation of the bitstring is a compressed representation thereof.

1   **33.** (currently amended) The bitmap value set forth in claim 22 wherein:

2           there is a plurality of the bitmap values in the database management system; and

3           the database management system provides further ~~a plurality of~~ user-accessible  
4   operations on the bitmap values.

1   **34.** (currently amended) The bitmap value set forth in claim 33 wherein:

2           certain of the user-accessible operations alter the range specifier and the representation  
3 of ~~the bitstring~~the bitstring as required to map the represented string of bits to a second subset  
4 of ~~the second set~~ that is required for the operation.

1   **35.** (original) A data storage device, the data storage device being characterized in that:

2           the data storage device contains code which, when executed in a computer system,  
3 implements the bitmap value set forth in claim 22.

1   **36.** (currently amended) A method employed in a database system of making a bitmap value  
2 that represents a first subset of a second subset of objects ~~external to the database system~~that  
3 are defined in the database management system.

4 the method comprising the steps performed in the database system of:

5           performing a first operation provided by the database system to users of the system, the  
6 first operation mapping a bitstring that is represented in the bitmap value onto the second  
7 subset; and the objects onto a second ordered set of identifiers defined in the database  
8 management system;

9           ~~mapping a bitstring that is represented in the bitmap value onto a subset of the second~~  
10 ~~set that includes the identifiers onto which the objects have been mapped; and~~

11           performing a second such operation, the second operation setting the bits in the  
12 bitstring that correspond to the identifiers onto which the objects have been mappedfirst subset.

1   **37.** (canceled)

1   **38.** (currently amended) The method set forth in claim 36 wherein:

2           ~~in the second set, the identifiers~~the objects are electronic product codes.

1   **39.** (currently amended) The method set forth in claim 36 wherein the objects are ordered and  
2 the step of mapping a bitstringperforming the first operation comprises the steps of:

3           making a range specifier that specifies a range of the ~~ordered set of identifiers that~~  
4 ~~includes the identifiers into which the objects have been mapped; and~~

5           mapping the bits in the bitstring to the specified range.

1   **40.** (original) The method set forth in claim 39 wherein the step of making a range specifier  
2 includes the step of:  
3       making a start value and an end value which together specify the range.

1   **41.** (original) The method set forth in claim 39 wherein the step of making a range specifier  
2 includes the step of  
3       making a prefix value which specifies the range.

1   **42.** (original) The method set forth in claim 36 further comprising the step of:  
2       compressing the bitstring.

1   **43.** (original) A data storage device, the data storage device being characterized in that:  
2       the data storage device contains code which, when executed in a computer system,  
3 implements the method set forth in claim 36.

1   **44.** (currently amended) A bitmap value employed in a database management system to  
2 represent a first subset of the row identifiers defined in the database management system,  
3       the bitmap value comprising:  
4       a mapping specifier that maps a string of bits to a second subset of the set of row  
5 identifiers, the second subset including the first subset; and  
6       a representation of the string of bits wherein a bit is set in the represented string of bits  
7 when the member of the second subset that is mapped to the bit corresponds to a member of  
8 the first subset, the database management system providing at least a first operation which  
9 permits users of the database system to directly specify the mapping of the string of bits to the  
10 second subset and a second operation that permits users of the database system to directly  
11 specify setting bits of the string of bits that correspond to the first subset; and  
12       the first subset is returned by a user-defined query executed by the database  
13 management system.

1   **45.** (currently amended) The bitmap value set forth in claim 44 wherein:  
2       ~~the database management system~~the first operation dynamically alters the mapping  
3 specifier ~~and the representation of~~such that the string of bits ~~as required to map the~~



4 ~~representation of the string of bits is mapped to a second subset of the row identifiers that~~  
5 ~~includes the first subset of the row identifiers.~~

1 **46. (currently amended)** The bitmap value set forth in claim 44 wherein:

2 ~~the query returns a row identifier when a field in the row identified by the row identifier~~  
3 ~~has an attribute specified in the query~~ the first subset is returned by a query which returns a row  
4 identifier when a field identified by the row identifier has an attribute specified in the query,  
5 whereby the bitmap value represents the set of fields whose values have the specified attribute.

1 **47. (original)** A data storage device, the data storage device being characterized in that:

2 the data storage device contains code which, when executed in a computer system,  
3 implements the method set forth in claim 44.

1 **48. (Canceled)**

1 **49. (Canceled)**

1 **50. (Canceled)**

1 **51. (Canceled)**

1 **52. (Canceled)**

1 **53. (Canceled)**

1 **54. (Canceled)**

1 **55. (Canceled)**

1 **56. (Canceled)**

**57. (Canceled)**